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## PATENT SPECIFICATION

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Applicant: Franz Eder (Austria)

Title in German of the object of the invention: Fenster mit zwei oder mehr in Abstand voneinander gehaltenen Scheiben

Patented in the area of the Federal Republic of Germany from April 2, 1953

Patent application laid open to public inspection: April 26, 1956

Granting of the patent made known: September 27, 1956

The priority of the application in Austria from February 25, 1953 for claims 3 and 4 is claimed.

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### WINDOW, HAVING TWO OR MORE WINDOWPANES, KEPT AT AN INTERVAL FROM ONE ANOTHER

Windows, having two or more windowpanes of known models (double window), which windowpanes are kept at an interval from one another in a single frame by means of spacing strips, are manufactured in different ways. Rectangular L-, Z- or U-shaped spacing strips are mostly used, which have the disadvantage that they exert an impermissible pressure upon the glass panes, it is difficult to assemble them, and that they consist of a multiple number of parts. Inasmuch as T-shaped spacing strips are used, these are entirely arranged between the windowpanes, or consist of elastic material so that a sufficient strength of the framing cannot be achieved. Also, the manufacturing of composite panes, having more than two panes is mostly

difficult and intricate. The attachment of the composite panes on the window frames is also inadequate, because mostly an impermissible pressure comes into effect, or the attachment means cannot readily be released.

These imperfections are avoided as a result of the invention.

Object of the invention is a window, in which two or more glass panes, are kept in place by means of spacing strips, which enable an easy assembly of the window sash, and prevent the formation of condensation water between the panes while allowing the insertion of the glass panes without having the rigid structural elements exert a damaging pressure upon the panes. In particular, the invention provides an opportunity for the assembly of a double window without having the inner parts pinned, or otherwise being undetachable, or being detachable but with difficulty. The invention consists in that at least a leg of the spacing strips, links a pane to such an extent that this dimension of the pane thickness and of the width corresponds to a sealing part, belonging thereto. The arrangement can also be created in such a way that the free leg of a Z-shaped spacing strip retains a sealing stripe, arranged between the free leg and the glass pane, without touching the glass pane. In addition to this, it is advantageous to have a metal foil or similar arranged between the spacing strip and the frame itself. In particular, this water-repellant, or hydrophobic, foil is in such a way arranged that it covers in a sealing manner the outer side of the spacing strips and the gaps between the structural elements of the pane attachment. In the arrangement of an L-shaped spacing strip, the insulating foil is essentially also arranged, resp. folded, as an L-shaped one. The pane package is functionally kept in place on the window's inner side by means of a strip, which engages into the frame with the help of a tongue-and-groove joint. The spacing strips are dried so that their humidity content is at the

lowest possible level, and are provided on all sides with a coating of metal-containing insulating paint.

For example, various embodiment forms of the object of the invention are diagrammatically represented in the drawings, wherein

Fig. 1 is a cross-section of a window, having two windowpanes,

Fig. 2 is a window, having three windowpanes,

Fig. 3 is a window, having two windowpanes in yet another embodiment.

The glass panes 1, which enclose the air space 2, are kept at an interval by means of the spacing strip 3. The spacing strip passes around the pane edge, and possesses a T-shaped cross-section. The reference symbols 5, 5' are sealings of elastic material, in particular rubber inserts, which - together with edges of the glass panes - are situated in the legs of the T-shape of the spacing strips. In order for these parts to be accommodated, the window sash 6 has a correspondingly fluted shape, as s in Fig. 1. A thin metal foil 10, having the width of the spacing strip, is inserted under the strip. The window parts, are fixed or established by means of the strip 7, which has a groove 8, and interacts with an elevation of the window sash in a way resembling a tongue-and-groove joint, and absorbs all lateral forces, which - where applicable - occur when the attachment screw 11 is tightened so that the pane itself remains protected from any impermissible pressure effect. The strip 7 is supported against spacing part 3, and the latter directly transmits the lateral forces onto the frame 6. The clamping in place of the glass panes 1 to the spacing strip 3 occurs now by means of the rubber insets (shims) 5, 5', which are located in the groove-shaped recesses of the parts 6 and 7, and are fixed therein. Between the glass panes 1 and the frame parts, respectively spacing parts, 6, 7, there are left wedge-shaped interstices so that

these parts also cannot press at these spots upon the glass plates. The wedge-shaped interstices are filled up with putty [glazing compound] 12 whereby the contraction of the wood-frame parts 6, 7 counteracts or inhibits the shrinking of the putty in the same direction, on account of which the shrinking of the putty does not have any disadvantageous consequences. The thin metal foil 10 is guided around the outer side of the spacing strips 3, and is superimposed in an overlapping manner at the butt joint. The metal foil prevents the penetration of moisture in the direction of the spacing strip, and therewith, to the air space [air chamber] 2. Moreover, the spacing strips are dried so that the content of the moisture becomes as low as possible, and are advantageously provided on all sides with a coating of metal-containing insulating paint. The interstice between the glass panes 1 is filled with a dry, respectively dried, gaseous medium, in particular air. All these measures prevent the formation of condensation water between the glass panes because neither moisture is present inside the panes nor can it also penetrate therein from outside. In order to also keep away moisture from the lower side of the window sash, a water outlet channel 15, having a discharge [drain] pipe 15 [sic] is mounted on the lower frame side bar 13. The additional fold 16 facilitates this effect.

In the exemplified embodiment, depicted in Fig. 2, three panes are arranged one after another. What has been stated in the exemplified embodiment, depicted in Fig. 1, is also accordingly valid in this case. The metal foil passes above entire spacing strips 3. While the outer spacing strips are T-shaped, the inner spacing strips have a Z-like cross-section. The fixing of the panes takes place without any pressure being exerted by solid parts upon the glass by means of the locking strip 7, attached by groove-and-tongue joint. For the purposes of a sealing fixing of all window parts, no nail is required by those parts, which are in the interior of the arrangement,

but only the screw 11 on the side of the chamber is required so that no sealing agents are required on the outside for the fixing of the window. The windows can also be manufactured in such a way that the parts 6 can be created as an insert frame, into which the window parts perfectly fit, and can be sealed by strip 7, whereupon the windows, which have thus been completed, are inserted in ready-made state into the actual window frames. This provides the advantage that the windows can be completed in the workshops, and on the construction site itself only the insertion into the window frames can take place.

In the exemplified embodiment, depicted in Fig. 3, the panes 1 are kept at an interval from one another by means of an L-shaped spacing strip. The web of the L-shape is situated between the window panes while the cross-beam underpins the inner pane. The panes are kept elastic by means of sealings in the window frame. The foil of water-repellent material 10 is arranged in such a way, that the outer side of the spacing strips and the gaps [joints] between the structural elements of the pane attachment are overlapped or covered in a sealing manner. The foil extends from the outer sealing up to the inner side of the inner pane whereby it surrounds the inner sealing. As a result of this, the foil appears as arranged in L-like shape. The spacing strips are dried so that their content of moisture is as low as possible, and, advantageously, are provided on all sides with a coat of metal-containing insulating paint. Certainly, the arrangement of an L-shaped, folded foil, in accordance with Fig. 3, can *mutatis mutandis* find an application in the examples depicted in Figs. 1 and 2. Concurrently, the foil could also surround the outer sealing, as in the case of the inner sealing. For the elastic sealings, rubber can advantageously be used. As a result of the invention, a pressure-free mounting of the panes and a reliable insulation against moisture is achieved, which could bring about a cloudiness or turbidity of the panes in the

intermediate chamber [interstice] 2. Also, in the a complete sealing is provided in the area oaf the frame corners.

The window in accordance with the invention has all advantages of the conventional coupled or composite windows , used until recently, but precludes the formation of condensation water between the window panes. A formation of condensation water between the panes was found to be very uncomfortable and burdensome due to the turbidity on the windowpanes, brought about by the said condensation water, because until recently the turbidity could not be eliminated. The sealing strip 7 provides an opportunity for an easy disengagement of all parts, pressure-free installation and a complete interception and deflection of the wind pressure. The rubber sealings and the foil are by all means arranged in such a way that the spacing strips do not come in contact at any particular spot with the rest of the wooden parts of the frame system, and they do not also come in contact by way of small air bridges.

## PATENT CLAIMS

1. Window, having two or more windowpanes which windowpanes are kept at an interval from one another in a single frame by mens of strips of T-, Z- and/or L-shaped cross-section, characterized in that at least a leg of the strip underpins a windowpane to such an extent that this measure corresponds to the pane thickness and to the width of a sealing strip, belonging thereto.

2. Window as claimed in claim 1, having Z-shaped strips, characterized in that the free leg of the Z-shaped strip retains in place a sealing strip, arranged between strip web and glass pane.

3. Window as claimed in claim 1 or 2, characterized in that a metal foil or similar is

arranged between the spacing strips and the window frame.

4. Window as claimed in one of the preceding claims, characterized in that the foil of water-repellent material covers the outer side of the spacing strips and the gaps [joints] between the structural elements of the windowpane attachments, and, in doing so, functionally surrounds the elastic sealing, resp. sealings.

5. Window as claimed in one of the preceding claims, characterized in that the windowpane package is kept in place on the window inner side by means of a strip, which engages in a tongue-and-groove manner into the window frame.

6. Window as claimed in one of the preceding claims, characterized in that the spacing strips are dried so that the content of moisture in them is reduced to the minimal possible extent, and they are advantageously provided on all sides with a coat of metal-containing insulation paint.

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